

mittently in the manner of the atonic flow previously described, and infected with a *Streptococcus viridans* and *Bacillus coli*. In this "B" bile was found a large amount of flocculent sediment, the cytology of which showed marked exfoliation of tall columnar, bile-stained gall-bladder epithelium, with much amorphous bile salts, cholesterolin crystals, pus cells, spiraled strands of mucus and bile-stained bacteria in the colony formation representative of true infection.

Her treatment consisted of duodenobiliary drainage, followed by duodenal enema twice a week for two weeks, then once a week for a month, then twice a month for a period of three months. Autogenous vaccines were given every five to seven days and caused a focalizing reaction reproducing the migraine. With the exception of pancrobilin nothing else was used for her constipation.

The result of this treatment showed steady progressive improvement both in symptoms and in the objective findings in the bile. The migraine attacks became of lighter and lighter severity and of decreasing frequency, and she noted a general systemic improvement in her increased alertness, power of concentration, better sleep states, increased amount of vigor, and especially notable to her was the progressive absence of her sense of daytime drowsiness and the rather remarkable clearing of the brownish pigmentation of her skin and improvement in her complexion.

She has recently been seen and reexamined and has had no headache for a little over four months, and says she feels splendidly well. She had had no bilious attacks; her skin was clear and showed practically none of the earlier pigmentation; her bowels were moving once daily and naturally, without any laxation; and her biliary drainage showed an absence of all the direct evidence recorded above upon which her diagnosis had been based.

(To be continued in February issue.)

VISCERAL ADHESIONS AND BANDS; NORMAL INCIDENCE. A PRELIMINARY REPORT.¹

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THE material which is the basis of this paper was obtained before the World War incidental to a much more comprehensive investigation into the etiology and treatment of the chronic intestinal invalid.

¹ Read at the Annual Meeting of the Gastro-enterological Association, Boston, June 6, 1921. Original data for this article was obtained in 1912-1914 through the courtesy of Professors Pick and von Hansemann, of Berlin, Professor Fränkel of Hamburg and the students then working in their pathological institutes.

Its presentation has been delayed for several years, but there does not in the meantime appear to have been published any data which considers the question of visceral adhesions or bands from the same points of view.

The literature upon adhesions which is based upon reported facts is scanty, contradictory and inadequate. Although early writers frequently mentioned the existence of adhesions or bands within the abdomen, modern scientific literature upon the subject may be said to date from the exceedingly instructive paper by Virchow,² written in 1853. Virchow not only discussed the question of adhesions in the adult, but recognized that such abnormalities were occasionally found in the fetus, and referred to the fact that some of his contemporaries or predecessors had attributed these variations in the fetus to intra-uterine peritonitis. Since the time of Virchow, however, surprisingly little in the way of accurate data has been presented, the majority of recent writers having considered adhesions largely from a surgical point of view, and even then usually on the basis of personal opinion rather than of published facts.

One of the most valuable of such papers, from the surgical point of view, is that by Morris, in³ which, although no actual data is given, he divides adhesions into four groups in the following order of frequency: (1) Gall-bladder, (2) cecum and appendix, (3) sigmoid and (4) pelvis. Robinson,⁴ in 1896, reported observations based upon a variable number of cases, from 40 to 150, tending to show that the viscera most frequently involved were, in their order of frequency, the spleen, mesosigmoid, pelvis, cecum and appendix and gall-bladder. Opitz⁵ reporting upon a series of 160 cases examined in 1914 agreed in general with Robinson, placing the sigmoid first in frequency, followed in order by the cecum and appendix.

There are also available a few studies of special areas, again mostly from a surgical point of view, of which by far the most reliable is the recent one by Smithies,⁶ reporting on gall-bladder adhesions in a series of 1000 operative cases. In general, it may be said, however, that there has been practically no serious attempt made to study adhesions from the point of view of sex and progressive age or from the point of view of the normal occurrence of adhesions in unselected material.

It is believed that the present paper will to some extent supply this deficiency, since it is based upon a series of over 1000 observations upon 297 unselected consecutive postmortem cases of all ages and both sexes, the only cases excluded being those few recently postoperative or those exhibiting recent frank peritonitis.

² Virchow's Arch., 1853, 5, 281.

³ Tr. Am. Assn. Obst. and Gynec., 1906, 19, 223.

⁴ New York Med. Jour., 1896, 63, 101.

⁵ Deutsch. Gesellsch. f. Chir., 1914, 43, 2, 107,

⁶ Jour. Am. Med. Assn., 1918, 71, 1804.

In the obtaining of the original data, on the one hand every attempt was made to secure accuracy, the original notes on one case being written immediately after the completion of the examination and before proceeding to the examination of any subsequent case. On the other hand attempt was made not to overlook any variations from the accepted normal.

The data having been obtained they were next divided for purposes of study into male and female groups. After further study these groups were again subdivided into age periods as follows: fetal, birth to two years, two to ten years, every decade from ten to seventy years and a senile group composed of those cases seventy years of age or over. Although when thus subdivided the number of cases in each age group averaged only about 20, being from this point of view unsatisfactorily small, yet it was possible from this original subdivision to observe certain general tendencies which were largely substantiated by dividing the male and female groups into only four subgroups. These subgroups were: fetal, birth to forty years, forty years to senile and senile. At later stages of study these four groups were again frequently condensed into two, the group below forty years of age and the group above forty years of age.

It has been generally considered that where adhesions are found in the fetus, they are the exception and not the rule. This is not correct and even recent attention which has been given the question of developmental bands fails to take into consideration the extreme frequency with which such abnormal adhesions or bands occur within the fetal abdomen.

A careful study of the data available showed that there were only 8.9 per cent of 180 male cases of all ages in whom adhesions were absent; in other words, adhesions were present in 91.1 per cent of these 180 male cases. In this male group there was a total of 65 different adhesions or bands. Examination of the male fetal group showed that 100 per cent of 18 cases presented abnormalities; in other words, no male fetus was free from some form of abnormal adhesion or band.

In the female group of 117 cases of all ages there were but 14.5 per cent in whom adhesions were absent; in other words, adhesions were present in 85.5 per cent of these cases. In this female group there was a total variety of 57 different adhesions or bands. Examination of the female fetal group showed that adhesions were absent in only 12.5 per cent of 16 cases; in other words, adhesions were present in 87.5 per cent of these female fetal cases.

An examination of the total number of structures involved according to age showed that there was practically no increase above the fetal rate in either sex until the age of forty years. In the male fetus there was an average of 3.2 viscera per case involved; in the female fetal group the average involvement was 2.9 organs per case. The actual percentage increase above the fetal rate in the male

until the age of forty years was *nil*; in the female under the same conditions there was an increase of only 3.4 per cent above the fetal rate. This contrasts markedly with an increase of 43.8 per cent above the fetal rate for the number of structures involved in the males of over forty years of age and with an increased involvement under the same conditions in the female of 51.7 per cent.

The actual number of variations, in type of adhesions present in relation to the given age periods, shows a striking similarity to the figures just quoted, with the single exception that the sudden increase occurs in the thirty-year decade rather than in the forty-year decade. In other words, in both sexes below the age of thirty less than eleven different types of adhesions were found in any one age group in either sex, the number varying only one or two points from the fetal rate. Above the age of thirty, on the other hand, there is in both sexes a striking increase of almost 100 per cent in the variety of adhesions present, and this increased variety tends still further to increase up to and including the senile group.

The complexity of adhesions present, or, in other words, the number of structures involved in any given adhesive process, shows an interesting relation to age, and the general variation runs uniform in both sexes. There is from the fetus onward a progressive decrease in the number of simple adhesions present in any age group; on the other hand there is a progressive increase with increasing age in both sexes in the percentage of complex adhesions to be found in any given age group from fetal to senile.

The actual adhesions or bands present show a most interesting uniformity in both sexes not only in the fetus but in older ages as regards percentage frequency. The order of frequency in 297 cases of both sexes for the seven most frequent actual adhesions is shown in the Table.

ACTUAL ADHESIONS OR BANDS PRESENT. PERCENTAGE
FREQUENCY, BOTH SEXES.

Adhesions or bands.	Male per cent.	Female per cent.
Gall-bladder to the duodenum and the transverse colon	25.6	24.8
Gall-bladder to the transverse colon	17.2	9.4
Gall-bladder to the duodenum	15.5	17.9
Appendix to the peritoneum	15.0	5.9
Omentum to the ascending and the transverse colon	11.1	12.0
Ascending colon to the transverse colon	10.6	5.9
Duodenum to the peritoneum	6.7	10.3

Study of the fetal groups shows that in both sexes the adhesion most frequently occurring is the same as that at the top of the list in the Table; in other words, from the gall-bladder to the duodenum and to the transverse colon. The second most frequent adhesion

in the fetus of both sexes is that of the gall-bladder to the transverse colon. It therefore seems reasonable to assert that these two most frequent adhesions are in both sexes of congenital or developmental origin, presumably existing as unabsorbed portions of the free edge of the lesser omentum or ligamentum hepaticocolicum.

A consideration of the location of adhesions from the point of view of the four quadrants of the abdomen shows that not only in the fetus but in all older age periods in both sexes the right upper quadrant is by far the most often involved. The right lower quadrant and then the left upper quadrant follow next in order of frequency.

A consideration of adhesions from the point of view of the individual organs involved at varying ages in both sexes is reserved for a later presentation.

Conclusions. 1. The frequency of occurrence of adhesions or bands in the fetus of both sexes has been greatly underestimated. Of a group of 34 fetal cases of both sexes only 5.9 per cent were free from demonstrable adhesions or bands; 100 per cent of the 18 male feti showed such variations from the normal.

2. The adhesions present in the fetus are less varied in number and of a definitely less complex type than those found to occur in later life.

3. The age of forty is critical in both sexes. There is practically no increase in frequency above the fetal rate of involvement for the different viscera by adhesions until the age of forty. Beyond the age of forty there is a sudden increase of about 50 per cent in the involvement of the different viscera by adhesions in both sexes, the increase being somewhat more marked in the female than in the male.

4. The two actual adhesions or bands found to occur most often in both sexes at all ages are in their order of frequency as follows: (a) Gall-bladder to the duodenum and to the transverse colon in both sexes; (b) gall-bladder to the transverse colon in the male and the gall-bladder to the duodenum in the female. In both the male and the female fetus the two adhesions or bands most frequently found were: (a) Gall-bladder to the duodenum and to the transverse colon; (b) gall-bladder to the transverse colon. It would therefore appear that these two most frequently occurring adhesions or bands are of congenital or developmental origin.

5. The regions or quadrants of the abdomen most frequently involved by adhesions or bands in both sexes are, in their order of frequency, as follows: Right upper quadrant, right lower quadrant, left upper quadrant, left lower quadrant.